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A NEW SPECIES OF SPHAEROSOMA.

FRED JAY SEAVER.

The genus *Sphaerosoma* was first described by Klotzsch about the year 1840 and was then represented by one species, *Sphaerosoma fuscescens*, which was described by him at that time, the exact description being given below for the purpose of comparison. Since that time two other species have been reported, *Sphaerosoma ostiolatum* Tulasne, *Fungi Hypogaei*, p. 184; and *Sphaerosoma fragile* Hesse. *Jahrbuecher fuer Wissenschaftliche Botanik*, published by Pringsheim, pp. 248 to 254.

CLASSIFICATION OF SPHAEROSOMA.

DISCOMYCETES.

Ascomycetous fungi with the hymenium, or fruiting surface, well exposed at maturity.

HELVELLINEÆ.

Receptacle stipitate and more or less clavate or pileate, or sessile and spreading; fleshy, waxy or rarely gelatinous. Hymenium always exposed.

RHIZINACEÆ.

Receptacle fleshy-waxy, brittle, sessile. Hymenium exposed from the first, plane or convex. Asci cylindrical, operculate. Paraphyses numerous, free.

SPHÆROSOMA KLOTZSCH.

Receptacle fleshy, sessile, convolute, roundish, outer surface covered entirely by the hymenium, within sterile. Asci cylindrical. Sporidia spherical, verrucose, hyaline.

SPHÆROSOMA ECHINULATUM Seaver n. sp. Plants gregarious or scattered, occasionally crowded, sessile, 1 to 8 mm. in diameter; at first almost spherical and regular in outline, becoming convolute with age, especially on the upper surface, often umbilicate; lower surface sterile, nearly plane, attached to the soil near the center by delicate hyphæ, very easily detached; at first white or whitish becoming reddish-brown on the exposed surface, then dark brown; the color begins with a brown spot in the center of the upper surface and spreads until it covers all of the exposed surface; at maturity having a brown velvety appearance due to the large, brownish paraphyses which extend far beyond the asci; under-surface light colored; hymenium at maturity covering the exposed surface of the plant, composed of very large asci and paraphyses; asci 40 to 50 by 300 to 500 mic., clavate, 8-spored; sporidia globose, at first smooth, filled with numerous guttulæ, and surrounded with a transparent exospore, gradually becoming rough on the outside, at maturity covered with spines which are several times as long as broad; spines 4 to 5 mic. in length by

2 to 2.5 mic. broad at the base, often bent at their apices, at maturity extending to the outer surface of the exospore; spore, excluding exospore 25 mic. in diameter, including spines or exospore, 35 mic. in diameter; paraphyses large, clavate, septate, brownish, 12 to 15 mic. in diameter at the apex; sterile part of the receptacle composed of rather loosely interwoven hyphæ, grading into pseudo-parenchyma, cells large.

Habitat—On the surface of damp soil between the tufts of grass in an open place, in the margins of woods near Iowa City. Plants collected from June to October.

The specific name under which these plants are described is suggested by the character of the markings of the spores, which are distinctly echinulate.

The description and measurements given above were made from fresh material collected at different times. Specimens preserved in alcohol vary somewhat; the most of the color disappears and the plants are a little contracted and the measurements are therefore a little less.

The plants described above were collected during the later part of the month of June in the summer of 1904, in large numbers in a ravine near Iowa City and upon examination were at once referred to this genus. The individuals are at first almost spherical in form, smooth on the outer surface, and of a whitish or lead color. As they mature, a small, brown spot is formed in the center of the upper surface, the brown color gradually spreading until it covers all of the exposed surface. They are at first regular in outline, becoming, at maturity, irregularly convolute and more or less depressed, so that at maturity the plants are roundish but more or less irregular in form, of a deep brown color and with a soft velvety appearance. Examination of sections of young plants shows the brown spot on the upper surface to be the beginning of the development of the hymenial layer and the brown color and velvety appearance to be due to the large paraphyses which contain brown coloring matter.

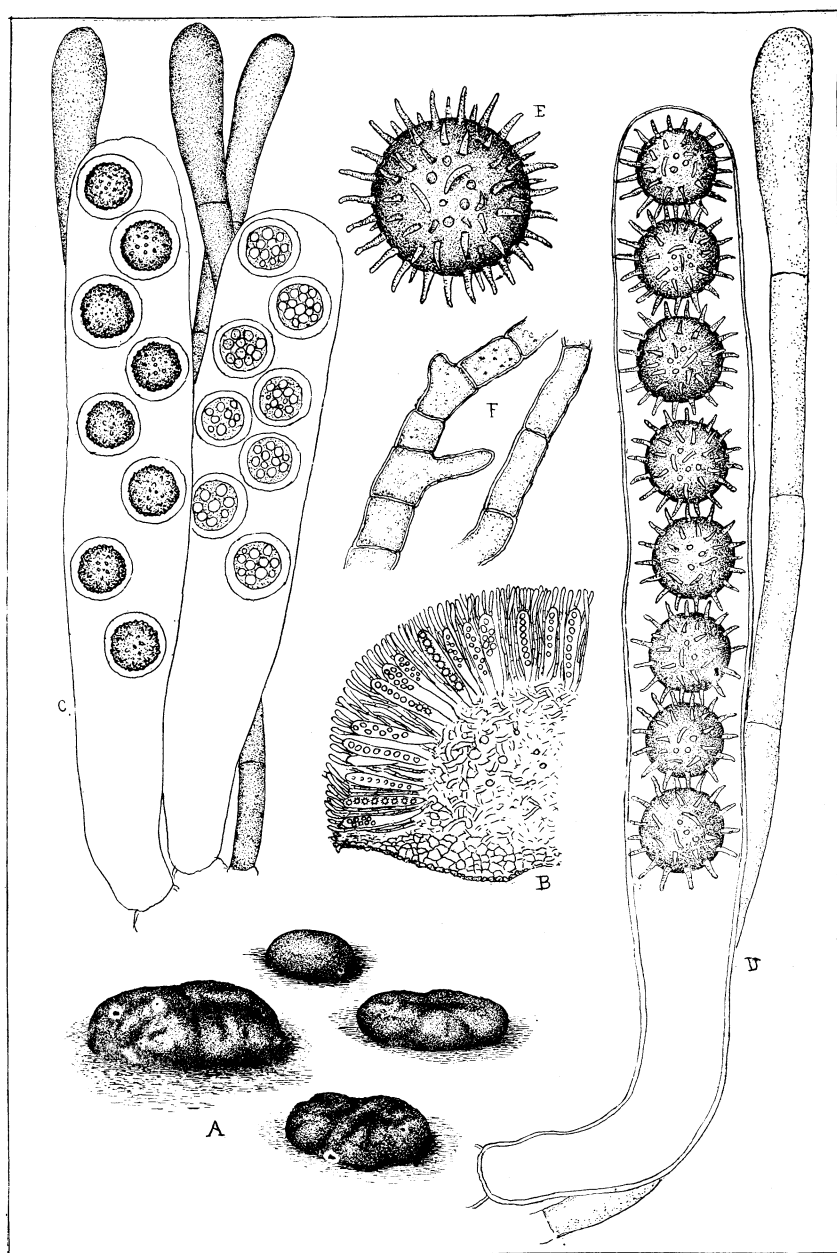
During the early stages of their development, the spores are located near the end of the ascus; they then spread out and become alternately arranged as shown in the diagram and at last are disposed in one row. They are at first smooth and filled with numerous oil drops which disappear as the spore matures and the whole body of the spore is surrounded by a transparent exospore. The first appearance of the roughenings on the outer surface occurs at the periphery of the spore proper within the exospore, the thickenings being at first very slight but gradually increasing until they reach the outer surface of the exospore. When mature a faint line may often be seen near the tips of the spines which is the boundary of the exospore but these become indistinct and in alcoholic specimens and often in mature spores of fresh material the boundary of the exospore is not visible at all, although at

an earlier stage it is very distinct. All gradations may be found between the smooth and echinulate spores, so that they are at first smooth, then verrucose and at last echinulate. The description and drawing of the verrucose markings on the surface of the spores of *Spharosoma fuscescens* Klotzsch might be explained by the fact that they were studied while immature, but this is not likely to be the case for both mature and immature forms are present in older specimens in the same plant. Microscopic examination shows on the surface in addition to the spines markings which resemble reticulations, but these are short and not continuous and are not seen at the periphery so that they are probably only spines bent so as to give this appearance.

The relative position of the hymenium is shown in cross-section and also the relation of the asci and paraphyses and the structure of the sterile part of the receptacle. The paraphyses are seen to be relatively large and to extend some distance beyond the asci. Beneath the hymenium the interwoven hyphæ give rise to a sort of pseudo-parenchyma which is more definite near the base where the cells are smaller.

Each of the other species described is reported as occurring in woods under leaves and thus showing a tendency to become subterranean species. *Spharosoma fragile* is described by Hesse as "ein unterirdisch-wachsender Discomycet." The plants described here vary in this respect, being found on the margin of a swampy place on the surface of rather hard, damp soil, in the shade of scattered tufts of grass, in a small ravine in the woods. They are attached to the soil by hyphæ which are so delicate that it is difficult to collect the plants without having them broken from the substratum.

These plants were collected in large numbers over a limited area and are generally more or less scattered but often several are crowded together. They were first found in this locality during the latter part of June but probably appeared much earlier than this. Frequent collections and studies were made in the field from this time until the first of October. The place was next visited in the latter part of September but at this time none of the plants could be found as the ground was covered with other forms of vegetation. Since these plants occur in such large numbers over this limited area it is likely that they will appear in the same locality during the next season, as such has often been found to be the case with other forms of Discomycetes. During the last three seasons, *Spharospora confusa*, another Discomycete has been collected in abundance on a sandy bank, over an area limited to a few rods in diameter from spring until autumn, but has never been collected in any other locality near Iowa City so far as is known. The same has been found to be true of other species where the habitat is constant. For these reasons these plants will be expected to appear in this locality again.



SPHAEROSOMA ECHINULATUM SEAVER n. sp.

SPHÆROSPORA FUSCESCENS Klotzsch.—Dietrich; Flora Regni Borussici, Vol. VII, No 467 (1839). Receptaculo solido, sphærico, nudo, gibboso, interdum depresso, sessili; basi fibrilloso, primo extus interusque sordide-albido v. pallido-gilvo, dein fuscente; ascis immersis, clavaeformibus, hyalinis; paraphysibus verrucosis, hyalinis.

The present species is distinguished from *Sphaerosoma ostiolatum* Tulasne, and *Sphaerosoma fragile* Hesse, by its solid receptacle and is then more closely related to *Sphaerosoma fuscescens* Klotzsch, the exact description of that species being given above for the purpose of comparison. The general description of the two species seems to be identical, except as to habitat and size of the plants. The characters which distinguish this species from the one described by Klotzsch are the size of the asci and spores and the markings on the surface of the spores. The measurements of the asci of *Sphaerosoma fuscescens* as given by Engler-Prantl in "Die Natürlichen Pflanzen-Familien" are from 22 to 26 mic. in diameter and the spores 17 to 20 mic. in diameter, while the asci of the plants described here are 40 to 50 mic. in diameter and the spores 30 to 35 mic. They are also distinguished by the slender spines on the surface of the spores instead of the verrucose markings described by Klotzsch. These markings are very distinct.

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EXPLANATION OF PLATE.

Fig. A, Several plants at different stages in their development, x 5.

Fig. B, Portion of a section of one of the plants showing relation of hymenium, x 50.

Fig. C, Asci and paraphyses, showing two different stages in the development of the spores, x 500.

Fig. D, Mature ascus and spores with paraphysis, x 600.

Fig. E, One spore removed showing the echinulate markings on its surface, x. 1200.

Fig. F, A portion of the mycelium from the soil, x 1000.